Date: April 22-26
Location – Waquoit Bay, NERR
NERRS Participants:

Monday, April 22

9:00 – 9:15am   Welcome and logistics, Jim Rassman and Alison Leschon

9:15 – 9:30   Overview of agenda and introduction of trainers and participants, Dave
                      Newcomer

9:30 – 10:45am   Overview of the National Spatial Reference System, Dave Newcomer,
                      Objective: Participants will have an in-depth understanding of the geodetic
                      reference systems that relate to vertical control networks
                              -   Including introduction to datums
                              -   Homework: review webinars on line prior to training

10:45 – 11:00am   Break

11:00 – noon   Infrastructure considerations for determining tidal datums, Michael
                      Michalski - CO-OPS
                      Objective: Participants will understand the relationship between tidal
                      datums, local vertical control networks and the NSRS
                              -   Homework –view the tidal datums webinar

Noon – 1:00pm   Lunch

1:00 – 3:00pm   Discussion and comparison of RTK, digital leveling and static GPS: What
                      are the differences in precision and what are the implications for various
                      types of ecological settings?
                      Objective: Participants will be able to determine which tools are best
                      suited for their specific applications and locations.

                              -   Dan Martin will give brief overview of the 3 instrument types
                                  and he, Dave Newcomer and Doug Adams will serve as panel
                                  for group Q&As.

3:00 – 3:15pm   Break

3:15 – 5:30pm   Collection of GPS data in the field, brief overview by Dan Martin
                      Objective: Participants will know how to set up a GPS campaign using
                      geodetic benchmarks, SETs, and data loggers.

Tuesday, April 23

| 8:30 – 10:30am | Overview and use of the Continuously Operating Reference Station (CORS) network and the Online Positioning Users Service (OPUS), Dan Martin
Objective: Participants will be able to enhance the accuracy of their GPS derived positions using CORS and OPUS
- Obtaining accurate positions using static data collection sessions
- Description of CORS information and its various applications, how to access CORS information, and how to use publicly available utilities for processing GPS data. Flavors of OPUS. |
|---|---|
| 10:30 – 10:45am | Break |
| 10:45 – noon | Overview of RTK data collection and its applications, Dave Newcomer
Objectives: Participants will understand how to use RTK to optimize vertical precision and accuracy. Participants will gain experience with using the RTK unit to obtain elevations on vegetation plots and SETs. |
| Noon – 1:00pm | Lunch |
| 1:00 – 5:00pm | Hands-on time with RTK equipment/break into groups; three groups in the field using RTK (Doug Adams, Dave Newcomer and Dan Martin will lead groups)
Objectives: Participants will know how to set up and use the RTK equipment. |

Wednesday, April 24

8:30 – 10:00	Continued hands-on time with RTK equipment, including discussions of troubleshooting technical issues that may arise with the equipment.
10:30-12:00	Application of RTK data, Dave Newcomer
Objective: Participants will be able to download and QA/QC their RTK data.
Noon – 1:00pm	lunch
1:00 – 3:00:00pm	**Begin Digital Leveling training,** Dan Martin
Objective: participants will understand basic concepts of precision and accuracy of leveling-derived data (including errors, misclosure, order and class of leveling, and leveling corrections), understand best practices for high precision digital barcode leveling in the field (especially wetland environments), and understand recording requirements. ..
- Leveling Introduction
- Leveling Equipment and Setup

3:15-5:00	Leveling field experience

Leveling field experience
Objective: participants will be able to successfully use high precision geodetic leveling techniques to measure elevation differences among any set of vertical marks, including both electronically recorded and hand-written data and codes.
- Collimation Check and Field Notes
- Hands on: Collimation Check

Thursday, April 25

8:30 – noon **Digital Leveling, continued,** Dan Martin
- Review/questions from day 1
- Hands on: Field leveling observations
- Reduction of field data

Noon – 1:00pm working lunch – Available Open Source Tools – open source GIS tools available to use the data, Jason Woolard

1:00 – 2:00pm Discussion on collaboration opportunities between attendees' respective agencies, Jim Rassman and Tonna-Marie Surgeon-Rogers

2:00 – 3:00pm Tying a local network together and to the NSRS; connecting monitoring data to the vertical network, led by Dave Newcomer
Objective: Participants will know how to combine GPS-derived data to leveling data and extend the network to environmental datasets, and how to gage network stability over time.
- When and how to choose among NSRS connection points
- Choosing appropriate survey techniques for connecting monitoring infrastructure to get accurate vertical heights ow to connect vertical datasets (e.g. SETs, water levels)
- Infrastructure monitoring plan – developing the plan for maintaining the network

3:00 – 3:15pm Break

3:15 – 5:00pm Continued from previous session

Friday, April 26

There is a recognition that we may be able to include this professional exchange opportunity in the previous day's agenda. If so, participants can decide how to best use this time. It may be good to have more field time with equipment.

8:30 – 10:15am Designing a Survey Plan for Your Reserve/Geospatial Infrastructure of Sentinel Sites, Philippe Hensel, Michael Michalski

Objective: Participants will be able to develop installation and maintenance plans for site-specific vertical control networks and identify strategies for tying monitoring infrastructure to vertical control networks.
- Geospatial Infrastructure for Sentinel Sites Overview, Philippe
- Recon, Datasheets and Local Network Planning and Installation

10:15 – 10:30am	Break

10:30 – noon   Continued, Designing a Survey Plan for your Reserve/Geospatial Infrastructure of Sentinel Sites
Objectives: Participants will benefit from group consultation on site-specific vertical control network planning.
- Participants present case studies of their locations identifying what vertical control and monitoring infrastructure exists and is needed based on their applications and ecological context.
- Participants will identify how they will use the equipment to install and maintain their networks drawing upon lessons learned from the training.

Noon   Depart